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**NOTE ON THE APPROXIMATE POSITION OF THE EOCENE DEPOSITS OF
MARYLAND.**

BY ANGELO HEILPRIN.

The positive determination of the relation which the older Tertiary deposits of Maryland—those of Ft. Washington, near the City of Washington, and Piscataway and Upper Marlborough in Prince George's County—hold to the typical American Eocene series as exhibited in Alabama, can only be arrived at when a direct stratigraphical continuity can be traced between the deposits of the two states, or between their previously recognized representatives in the intervening states. This is due to the fact that several members of the Eocene series appear to be absent from this portion of the Atlantic border, but exactly which it has as yet been impossible to determine. The presence of strata of Jacksonian age has never been detected, nor have we any positive knowledge concerning the existence in the State of any beds which may be looked upon as the equivalents of the Orbitoide limestone, although Oligocene (Vicksburgian) strata may exist along the Chesapeake. But whether the deposits in question—Ft. Washington, Piscataway, and Upper Marlborough—represent the Claibornian, Buhrstone, or Eo-Lignitic is a matter of considerable uncertainty, perhaps largely due to their comparatively feeble development. Almost the only evidence we have bearing upon this point is derived from the character of the contained fossils, but even here the results obtained are far from satisfactory, and for two reasons: in the first place, the character of the Eocene fossils is largely uniform throughout the greater portion of the entire series, as is shown by nearly the lowest and highest exposures in the State of Alabama; and in the second place, the great distance intervening between the two localities—Alabama and Maryland—may readily account for certain differences in the general aspect of the two fossil faunas, which otherwise would probably be attributable to a non-contemporaneity in the periods of their introduction. The evidence afforded by lithological characters is almost equally unsatisfactory, since there is a frequent repetition of the general rock aspect—green sands, clays, and siliceous marls—observable at different stages of the series. Conrad, the only investigator whose observations on this subject

are of scientific value, affirms that the majority of the fossil mollusca are of the Claiborne type, and he consequently correlates the beds containing them in a general way with those exposed on the Alabama River, although without specially indicating with what portion of the Claiborne section they were supposed to correspond. Indeed, about the only fossils obtained from the Maryland localities which can in any way be said to be either characteristic of or peculiar to them are *Panopea elongata*, *Pholadomya Marylandica*, *Pholas petrosa*, *Cucullæa (Latiarca) gigantea*, *Ostrea compressirostra*, and one or two doubtful species of *Crassatella*. All the species here named, if we except the doubtful *Crassatellas* and *Ostrea compressirostra* are good species, and if we further deduct *Cucullæa gigantea*, the only Eocene species of the genera to which they belong thus far discovered in the eastern or southern United States. On the whole, therefore, they afford little or no clue to the exact determination of the age of the deposits in which they occur. It is true that an examination of the homotaxial deposits of Europe shows the genera *Pholadomya* and *Panopea* to be more especially characteristic of the lower or even lowermost horizons of the Eocene series, as in the English and French basins, but no special inference can be drawn from this circumstance, since the species are not the same, and the genera survived through the succeeding periods to the present day. In the case of *Ostrea compressirostra*, however, we have a much more tangible point. The species, first described and figured by Say (Journal of the Academy of Natural Sciences, iv, p. 133), is certainly very intimately related to the *Ostrea Bellovacina* of Lamarck, and apparently undistinguishable from certain varieties of that species.¹ Now this species, although not exclusively restricted to the lowest Eocene beds, is nevertheless highly characteristic of the Thanet sands, below the London Clay proper and also below what was formerly designated as the "Plastic Clay" series, where it constitutes a true basement accumulation; and it holds almost precisely the same relation to the beds of the Paris basin, where, according to Deshayes (*Animaux s. Vertèbres*,

¹ The distinguishing characters of the beaks pointed out by Say do not seem to hold in many instances, as is proved by specimens of the *O. Bellovacina* from the "London Clay" of Bognor, England, in the collections of the Academy, which do not differ as much from certain American specimens as these last do among themselves.

Bassin de Paris, ii, p. 117) it occupies the horizon of the Bracheux sands. The species wherever found appears to be considerably restricted in its vertical range, and its occurrence, therefore, in some of the American deposits would seem to afford some more decided indication of the true age of those deposits than could be obtained from the character of the limited number of its contained fossils taken as a whole. Associated with *Ostrea compressirostra* were found casts of the large *Cucullæa gigantea* (Conrad, *Journ. Ac. Nat. Sciences*, vi, p. 215, 1830), a species which appears not to be represented in any of the equivalent European formations. But in Virginia, in beds which can be shown to be the direct equivalents of those of Maryland, there occurs in addition to the *C. gigantea* of Conrad, a second species of *Cucullæa*, the *C. onochela* of Rogers (*Trans. Am. Philos. Soc.*, new ser., vi, p. 373; *Latiarca idonea* Conr., *Proc. Acad. Nat. Sciences*, 1872, p. 53—no locality stated), which, if not identical with the *C. crassatina* of Lamarck, from the Bracheux sands of the Paris basin, is certainly most intimately related to it, and can be considered in every way as its immediate representative.¹ It should also be stated that the only other species of *Cucullæa* described by Deshayes (*Animaux s. Vertèbr.*, *Bassin de Paris*, i, p. 109) from the Paris basin (*C. incerta* Desh.) is found in the same horizon with the *C. crassatina*, and, likewise, the single species described by Searles Wood from the older Tertiaries of England is a lower Eocene form.

If such comparisons are of any value stratigraphically we may fairly look upon the Maryland Eocene deposits—the Piscataway sands below, and the Marlborough rock above—as representing a horizon nearly equal to that of the Thanet sands of England and the Bracheux sands of the Paris basin, or of the British Bognor

¹ I have had no specimens of the European species with which to institute direct comparisons, but as the species is a large one, and with well-defined characters, I have relied upon the figures and characters as furnished by Deshayes (*Coquilles Fossiles, Environs de Paris*, i, p. 193; *Atlas*, Pl. xxxi, figs. 8 and 9), which are well known for their accuracy. The *C. crassatina* is catalogued by Prestwich (*Quart. Journ. Geol. Soc.*, 1854, p. 109) and Morris ("Cat. Brit. Foss.," p. 197) as being also an English form, and as belonging to the Thanet series, but by Searles Wood ("Monograph of the Eocene Mollusca" Bivalves, in *Palæont. Soc. Reports*, 1861, p. 94), the species occurring at Herne Bay, Faversham, etc., is considered to be distinct (*C. decussata* Park).

rock (= London Clay).¹ In either case they would be near the base of the Eocene series.

In the scale of the American series as exhibited in Alabama, they would occupy a position probably near the base of the "Buhrstone," or possibly even lower, as the equivalents of the beds exposed on Bashia Creek, and Cave and Knight's Branches ("Eo-lignitic").

¹ The similarity existing between the Marlborough and Bognor rocks has been pointed out by Conrad (Proc. National Institution, p. 172, 1841).